

# Physics 1422, General Physics I-A

## Section 01, Spring 2007

**Dr. Yost**

<b>Office:</b>	E339 Baylor Sciences Building	<b>Textbooks:</b>	A.P. French, Newtonian Mechanics, W.W. Norton, 1971
<b>Lectures:</b>	MWF, 1:00 – 1:50 PM D109 Baylor Sciences Building		Douglas Giancoli, <i>Physics for Scientists &amp; Engineers</i> , Vol. 1, 3 <sup>rd</sup> Edition, Prentice Hall, 2000
<b>Hours:</b>	MWF 4:00 – 5:00 PM or by appointment		
<b>E-Mail:</b>	Scott_Yost@Baylor.edu		L. McDermott, P. Shaffer, <i>et al.</i> , <i>Tutorials in Introductory Physics</i> , Prentice Hall, 2002
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<b>Web Site:</b>	<a href="http://scott-yost.baylor.edu/phy1422">http://scott-yost.baylor.edu/phy1422</a>		<i>Lab Manual for 1408 / 1422 / 1425</i>

Welcome to section 01 of **Physics 1422, General Physics I-A** for science and engineering students! This course is an introduction to the physical concepts of mechanics and thermodynamics. By the end of the course, you should be familiar with Newton's Laws, forces, work and energy, momentum and inertia, rotational motion, oscillation and waves, and some aspects of thermodynamics. The purpose of this course is to introduce you to the ways in which a physicist models nature using mathematics, and uses these models to understand our world. In the process, you will also gain facility with problem solving in mechanics and thermodynamics.

This course differs from PHY 1425 in that it requires only concurrent enrollment in Calculus 1 (MTH 1321), not previous completion of a calculus course. Thus, physics and calculus are learned together, as is appropriate, since Newton invented calculus for the purpose of formulating his laws of mechanics. But physics is more than just an application of mathematics. It is a framework for understanding our universe. I hope you will come to see physics as more than just a series of equations to be memorized, but rather as a set of ideas that can be used to precisely model our world.

## Physics is a hands-on subject!

You cannot do well in this course just by watching your professor work problems on the board, or by asking your friends to show you how they did them. The problems are designed to help you discover the ways in which the concepts of physics apply to a variety of situations. There is absolutely no substitute to struggling through the problems yourself. Do not leave the problems to the last minute. Most of them are intended to build your facility for solving complex problems, and require too much thought to be done in a rush, as if they were simple exercises to be worked while sitting at the computer. Those who do this normally do not learn the material well, and have disappointing performance on the exams. If you need more help with the problems than is available in our limited class time, use the online discussion boards, form study groups, or come to my office hours.

Your grade in the course should largely reflect the amount of effort you put into the homework. However, it is a mistake to make completing the homework your only goal. The real goal is to understand the material, and to do this well, you must first read the chapter, and not blindly try to start on the problems, hoping you can skim the material for the right equations to use. That approach may get you through the homework more quickly, but without the understanding you will need to apply your knowledge in new contexts, including the exams. If you have trouble with one of the problems, go back and read the chapter some more, or try some different problems and come back to it. There is no substitute for thoughtfully reading the material – this is the key to success in this course and most other college-level courses.

The mathematical tools we will use include algebra, trigonometry, geometry, and vector algebra. Everyone should have a comfortable working knowledge of algebra, geometry and trigonometry, since these are used extensively on a daily basis. In physics, mathematics is not just a means of solving problems, but the language in which the fundamental ideas are expressed. Any weakness in these areas will have a strong impact on your understanding of physics. You should consider a tutor if you feel you need one.

Calculus was invented to describe the kind of physical problems we will be considering, and is essential to express physical laws, as Newton first realized. This course should be taken concurrently with a calculus course, and you should find that the two forces help to reinforce each other. Seeing calculus in a physical context will help you understand the concepts of differentiation and integration more fully and intuitively.

## Grading

Your grade for the course will be determined by a combination of factors weighted as indicated below. The minimum passing grade is a final total of 60.0%, including a laboratory grade of at least 60.0% as well. **Failing laboratory grades are unacceptable.** If you fail the laboratory, you fail the course as well. **Attendance is required** in all Baylor courses. Excessive absences (more than 10, excused or not) will result in failure of the course.

You may view your grades on the **Blackboard** system ([my.baylor.edu](http://my.baylor.edu)). Homework grades can be viewed while logged into the **CAPA** system ([capa.baylor.edu](http://capa.baylor.edu)).

Hour Exams	35%
Comprehensive Final	20%
Homework	25%
Laboratory*	20%

\* Must have passing laboratory grade.

90 – 100%	A
85 – 89%	B+
80 – 84%	B
75 – 79%	C+
70 – 74%	C
60 – 69%	D

## Laboratory

Each of you should be enrolled in one of the laboratory sections associated with this course. The laboratory experiments illustrate some of the concepts we will be studying, and will serve to remind you that physics is an observational science, grounded in experiment. Some of the laboratory sessions will be used as tutorials, which are exercises you will work through together to enhance understanding of the conceptual elements of the material being covered in the textbook and lectures.

Laboratories begin the first week of classes. Note that for safety reasons, no food or drink is allowed in the laboratories, and closed-toe shoes must be worn for experiments.

You will be assigned a laboratory grade by your laboratory instructor. **You must have 60% or better in the laboratory to pass the course**, independent of any other grades. Since laboratory instructors have varying standards, the laboratory grades will be adjusted to an average of 85% in sections with a lower average.

## Exams

Three exams will be given during the term. A comprehensive final exam will be given at the end of the course.

Calculators may be used on these exams, but not notes. You will need to remember certain equations for the hour exams. These equations appear on the review sheets which are posted on the **Exams** page of the course web site. If you do not have a scientific calculator, you should get one before the first exam.

### Missed Exams

There are no make-up exams. To allow for emergencies or unavoidable conflicts, one exam grade may be dropped for an approved and documented absence. No request to drop an exam grade will be made without documentation, and any absences for a scheduled event must be approved in advance of the exam. You may not drop more than one exam grade.

You must make every effort not to miss the final exam, since there is no make-up final and this grade cannot be dropped. In case of a missed final, Baylor policy requires an incomplete, which must be resolved in the next semester. A complete schedule of final exams is published on the Baylor website. Baylor policy permits the schedule to be changed if three final exams are scheduled on one day. If you have a conflict, you must resolve it by mutual arrangement between the professors of the courses involved. Normally, exams for non-major electives will be rescheduled before exams in major or required courses. Check your final exam schedule now! **Any requests to reschedule the final exam must be received at least 30 days before the exam.**

### Exam Structure and Strategy

The exams will normally have two or three multi-part homework-style problems, plus some less computational questions which will test your understanding of the concepts in the chapters covered. The homework-style questions will be closely modeled on assigned problems of medium difficulty, but will not duplicate them exactly. To do well on these, you should be sure to understand the reasoning behind the solutions to each problem, not just memorize which equations were used. The conceptual questions are usually derived from lecture examples and the tutorials.

## Preparation for Exams

The best exam preparation is to put a serious effort into the reading and homework, doing as much of the work yourself as you can. Working through someone else's solution is no substitute for puzzling through the problem on your own. Those frustrating moments (or hours) when you can't figure out which equations apply, or when you don't seem to have all the variables you need, are the same moments when most of your learning is occurring. The effort you put into homework will pay off when you take the exams.

A good way to prepare for exams is to review your old homework, both the problems and conceptual questions, and also any examples worked in class. The exam problems will generally be similar to these. Concentrate on the early set-up parts of the problem, since this is usually what causes the most trouble in a timed situation. You must practice to be able to identify the relevant concepts in a problem quickly. Try doing this without looking at the answers. If a certain type of problem continues to cause trouble, try working it repeatedly, after waiting a few days between attempts. Also, review the lecture examples (lectures are posted on Blackboard) and tutorials.

## Disability Accommodations

If you have a disability requiring special arrangements for an exam, this will be accommodated if you provide the required documentation at least 7 days before the exam. If the request applies to all exams, you only need to make the request once. **No requests for special accommodations received less than 7 days before the exam will be honored.**

## Homework

How much you learn in this course will depend most strongly on how much time and effort you put into the homework.

The homework in this course will be graded using the **CAPA on-line homework system**. This system provides individualized problems for each student. You will find a set of help links at the right of the screen. These are also available from the CAPA login page and from the CAPA main menu after you log in. Answers with complete solutions will be posted after the set is due.

CAPA problems are always due at **noon** on the due date, according to the computer clock, unless otherwise noted. **The cutoff is absolute.** Late homework cannot be accepted for any reason, because the solutions are posted the same day, and some problems will be discussed in class. However, the lowest homework score of the semester will be dropped, which will effectively provide an exception for one emergency per student.

## Homework Strategy

You should not think of homework as a routine task to be completed, but as a central element of the course which is essential to your learning. It is the *process* that matters most, not the answer. Your approach to the homework is probably the biggest factor which will influence your success in the course.

Homework begins with reading the textbook. You should always try to read the sections being discussed in class ahead of time, so that you will not be confronting new material in the lectures. The goal isn't to memorize new equations, but to understand the physical concepts mathematically. Most of the equations are easy to remember once you fully understand them. Physics should be read with a pencil and paper at hand, so that you can work through the examples and be sure you understand any difficult points. You can then come to the lectures prepared to ask questions about anything you couldn't understand on your own. If you get behind on the reading, the course can become much more difficult than it has to be. It often helps to read the material more than once. You should find that you understand much more of the reading after you have done the problems.

After you have read the sections being discussed in class, you should start on the homework from those sections. You should start on the appropriate problems immediately, and not wait until just before they are due. Working the problems will help you understand the rest of the chapter much more completely. You may find it useful to work in groups, but be careful not to let your collaborators do too much of the work for you. It is important to be able to solve the problems yourself.

If you find yourself having difficulty on the homework, do not let yourself get too far behind before seeking help. You should come to the office hours, and ask the Physics Department office about tutors as soon as you begin having difficulty. The department provides free tutors in the third floor E wing of the Baylor Sciences Building. A schedule is on the wall near the windows.

## The CAPA System

Homework will be assigned online using the CAPA system, which provides individualized problems for each student. To access it, go to the page <http://capa.baylor.edu> using a web browser. Click on the **CAPA Login** button to see the login screen. Select the course PHY1422-01 from the pull-down menu, and enter your student ID (either the 9-digit number on your ID card, or your Bear ID). You also must enter a “CAPA ID”, which is a four digit number unique to each student and problem set. If you don’t know the CAPA ID for a set, you may request one using the buttons below. Once you know the CAPA ID, you can enter it and press the **Enter CAPA** button.

Once in the system, you will see the CAPA Main Menu, which permits you to work problem sets, view their grades, and participate in online discussions.

- **Try Current Set** is the most important link, for working the problems.
- **View Previous Set** shows the answers to a closed set.
- **Term Summary** is a list of scores on each problem in each set.
- **Homework Grades** shows the grades on each set, plus graphic information on the overall class performance.
- **Problem Discussion** is a problem-related discussion board, for requesting or posting help on individual problems.
- **Close Window** ends a session securely by closing the window.

When an answer is graded, answer code shows whether the answer is correct, whether the units are right, and whether the number of significant digits is correct. Answers are checked in the order of units, then significant figures, then correctness. Incorrect units or significant figures will not deduct from the allowed number of tries. If the units and significant figures are right, then the problem is graded, and any incorrect answers will count against the allowed number of tries.

The answer codes are:

- **Y** correct answer.
- **N** incorrect answer.
- **U** wrong units.
- **S** wrong number of significant digits.

**BAYLOR UNIVERSITY** **CAPA ONLINE HOMEWORK SYSTEM**

Baylor > Physics > CAPA Online Homework System > Problem Set 1

**CAPA Online Homework System**

**Problem Set 1**

Try Current Set  
Set 1 is not yet open.

Term Summary

Homework Grades

Problem Discussion

Close Window

**SECURITY WARNING**

CAPA login sessions do not expire until the browser is closed. To end your session securely on a shared workstation, please

close your browser

to prevent unauthorized access to your CAPA problem sets.

Course: 1422-01-20054  
Control Center  
Help  
- About CAPA  
- System Requirements  
- Logging In  
- Answering Questions  
- Units in CAPA  
- Significant Digits  
- Printable Instructions (PDF)  
- Demonstration Set  
Term Summary  
Homework Grades  
Problem Discussion  
Official Time  
Plotting Tool  
Login Screen  
Close Window

If you have any questions or comments regarding the Physics Department's online homework system, please address them to the Capamaster at [capamaster@capa.baylor.edu](mailto:capamaster@capa.baylor.edu).

### CAPA Main Menu

Avoid using the “Back” button on your browser: most browsers automatically repost the previous data, which can lead to the loss of one of your tries for any incorrect answers. Always use the navigation buttons and links on the web page.

Most problems will require considerable thought, and should not be done as if they were simple exercises, while sitting at the computer. Draw pictures and set up the problems algebraically on paper first. Put in numbers only after you have completed the necessary algebraic work. It is much easier to find errors in algebra than in numerical calculations. Although the computer only grades the answer, the process of arriving at the correct answer is extremely important to your learning.

If you find yourself becoming frustrated in your attempts to get the correct answer to a problem, try using the online Discussion board which is linked to each homework set. I will post hints there, and you can exchange messages with other people answering problems. I may remove hints which give away too much of the solution, however, since this may prevent other students from learning how to solve the problems themselves, and cause them to do poorly on the exams. Be sure to start the problems early enough that you have time to exchange questions and answers while working them. The most successful students often start the problem sets as soon as they are open.

If you would like a printed copy of the set to take with you while you work the problems on paper, you can get one through a button at the top of each set which creates a PDF version of the set that you can print. If you print the set after it is closed, you will get complete solutions to every problem. This should be helpful in preparing for the exams.

## Calendar

This is a schedule for the Spring, 2007 semester of Section 1 of Physics 1422, General Physics I. The schedule shows the dates when the lectures will cover each chapter. Chapters are denoted by an author's initial and chapter number, so that F1 means chapter 1 in A.P. French's text, G15 means chapter 15 in D. Giancoli's text, *etc.* The dates marked Set 1, Set 2, ... are when these online homework sets are due. They will be discussed in class on the due date.

Week	Monday	Wednesday	Friday
Jan. 8-12	Syllabus, CAPA	G1, F1	Set 1, F2
Jan. 15 - 19	<b>MLK Day</b>	F2	F2-F3
Jan. 22-26	F3 (to end)	Set 2	F4
Jan. 29 - Feb. 2	F4	F4-F5	Set 3
Feb. 5-9	<b>Exam 1: F1-F5</b>	F6-F7	F7
Feb. 12 - 16	F7	F8	Set 4
Feb. 19 - 23	F9	F9	F9, Set 5
Feb. 26 - Mar. 2	F10	F10	<b>No Class</b>
Mar. 5 - 9	F11	Set 6	<b>Exam 2: F6-11</b>
Mar. 12 - 16	<b>Spring Break</b>		
Mar. 19 - 23	G15	G15-16	Set 7
Mar. 26-30	G10	G10	G11
Apr. 2 - 6	Set 8	G13	<b>Easter Break</b>
Apr. 9 - 13	<b>Easter Break</b>	G13	Set 9
Apr. 16-20	<b>Exam 3: G10,11,13,15,16</b>	G17-18	G19
Apr. 23 - 27	G19, Set 10	G20	G20
Apr. 30 - May 4	Set 11	<b>Final: May 8, 9:00-11:00 AM</b>	

Requests to reschedule a final for an approved reason must be received by April 7.

## Topics Covered

- G1 Introduction, Measurement, Estimating
- F1 A Universe of Particles (overview, orders of magnitude, estimating)
- F2 Space, Time and Motion (vectors, reference frames, velocity)
- F3 Accelerated Motions (including projectiles, circular motion)
- F4 Forces and Equilibrium (balancing forces and torques)
- F5 The Various Forces of Nature (fundamental forces, contact forces, ...)
- F6 Force, Inertia and Motion (overview of Newton's Laws and inertia)
- F7 Using Newton's Laws ( $F = ma$ , resisted motion, air resistance, simple harmonic motion)
- F8 Universal Gravitation (Kepler's Laws, orbits, weightlessness)
- F9 Collisions and Conservation Laws (momentum and impulse)
- F10 Energy Conservation in Dynamics; Vibrational Motions (work, kinetic and potential energy, small oscillations, energy diagrams)
- F11 Conservative Forces and Motion in Space (vertical circular motion, pendulum, orbits, escape velocities)
- G15 Wave Motion (wave speed, energy, boundary conditions, superposition)
- G16 Sound (sound waves, musical instruments, decibels, interference)
- G10 Rotational Motion about a Fixed Axis (torque, moments of inertia, rolling)
- G11 General Rotation (rigid body motion in three dimensions, collisions)
- G13 Fluids (density, pressure, buoyancy, Bernoulli equation)
- G17 Temperature, Thermal Expansion and the Ideal Gas Law
- G18 Kinetic Theory of Gases (internal energy, phase diagrams)
- G19 Heat and the First Law of Thermodynamics (heat, heat flow, ideal gas processes)
- G20 Second Law of Thermodynamics (heat engines, refrigerators, entropy)